

CLAIMS

What is claimed is:

- 1 1. A method of backing up a file, comprising:
 - 2 (a) making a change to an original version of a file thereby creating a new version of the
 - 3 file;
 - 4 (b) saving said new version;
 - 5 (c) computing a transformation operator which is indicative of the differences between the
 - 6 original version of the file and the new version; and
 - 7 (d) saving said transformation operator.
- 1 2. The method of claim 1 wherein (d) includes saving said transformation operator in a
- 2 separate file.
- 1 3. The method of claim 2 wherein said separate file containing said transformation operator is
- 2 stored on a storage medium that also contains said new file version.
- 1 4. The method of claim 3 wherein said storage medium comprises a RAID storage subsystem.
- 1 5. The method of claim 1 wherein said transformation operator includes a difference value,
- 2 said difference value being the difference between a numerical value in the original file version
- 3 and a numerical value in the new file version.

1 6. The method of claim 1 wherein said transformation operator includes words or binary
2 encoded values that have been deleted from the original file version to produce the new file
3 version.

1 7. The method of claim 6 wherein said transformation operator also includes words or binary
2 encoded values that are present in the new file version but are not present in the original file
3 version.

1 8. The method of claim 1 further including making a further change to said new file version to
2 create a second new file version, saving said second new file version, computing a second
3 transformation operator which is indicative of the differences between the new file version and the
4 second new file version, and saving said second transformation operator.

1 9. The method of claim 1 further including making a further change to said new file version to
2 create a second new file version, saving said second new file version, computing a second
3 transformation operator which is indicative of the differences between the original file version and
4 the second new file version, and saving said second transformation operator.

1 10. A method of recovering an original version of a file that has been overwritten by a new
2 version of the file, comprising:

- 3 (a) retrieving a transformation operator which is indicative of the differences between the
4 original version of the file and the new file version; and
5 (b) applying said transformation operator to the new file version.

1 11. The method of claim 10 wherein said transformation operator is stored in a separate file.

1 12. The method of claim 11 wherein said separate file containing said transformation operator
2 is stored on a storage medium that also contains said new file version.

1 13. The method of claim 12 wherein said storage medium comprises a RAID storage
2 subsystem.

1 14. The method of claim 10 wherein said transformation operator includes a difference value,
2 said difference value being the difference between a numerical value in the original file version
3 and a numerical value in the new file version.

1 15. The method of claim 10 wherein said transformation operator includes words or binary
2 encoded values that have been deleted from the original file version to produce the new file
3 version.

1 16. The method of claim 15 wherein said transformation operator also includes words or binary
2 encoded values that are present in the new file version but are not present in the original file
3 version.

1 17. A computer system, comprising:
2 a processor;
3 an input device coupled to said processor; and

4 a non-volatile a storage device coupled to said processor, said storage device containing
5 files and containing a transformation operator which is indicative of the differences
6 between a first version of a file and a second version of the file.

1 18. The computer system of claim 17 wherein said transformation operator is stored in a file
2 that is separate from the file containing the second version.

1 19. The computer system of claim 17 wherein said storage device comprises a RAID storage
2 subsystem.

1 20. The computer system of claim 17 wherein said transformation operator includes a
2 difference value, said difference value being the difference between a numerical value in the first
3 file version and a numerical value in the second file version.

1 21. The computer system of claim 17 wherein said transformation operator includes words or
2 binary encoded values that have been deleted from the first file version to produce the second file
3 version.

1 22. The computer system of claim 21 wherein said transformation operator also includes words
2 or binary encoded values that are present in the first file version but are not present in the second
3 file version.

1 23. The computer system of claim 17 wherein said second file version has been changed
2 further into a third file version, and said storage device also contains a second transformation
3 operator which is indicative of the differences between the second file version and the third file
4 version.

1 24. The computer system of claim 17 wherein said second file version has been changed
2 further into a third file version, and said storage device also contains a second transformation
3 operator which is indicative of the differences between the first file version and the third file
4 version.

1 25. A computer system, comprising:
2 a processor; and
3 a non-volatile a storage device coupled to said processor, said storage device containing
4 files, one of said files being a third version and having two prior sequential
5 versions, the earliest version being a first version and a latter version being a second
6 version, and said storage device contains a first transformation operator which is
7 indicative of the differences between the first version and the third version and said
8 storage device contains a second transformation operator which is indicative of the
9 differences between the second version and the third version.

1 26. The computer system of claim 25 wherein said storage device comprises a RAID storage
2 subsystem.

1 27. The computer system of claim 25 wherein said transformation operators include a
2 difference value, said difference value being the difference between a numerical value in one file
3 version and a numerical value in another file version.

1 28. The computer system of claim 25 wherein said transformation operators include words or
2 binary encoded values that have been deleted from one file version to produce another file version.

1 29. The computer system of claim 28 wherein said transformation operators also include words
2 or binary encoded values that are present in one file version but are not present in another file
3 version.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100